

Apparent temperature profile of rough surface observed by TIR on board Hayabusa2

*Hiroki Senshu¹, Naoya Sakatani², yokota yasuhiko^{3,4}, Tomokatsu Morota⁵

1. Planetary Exploration Research Center, Chiba Institute of Technology, 2. Department of Physics, Meiji University, 3. Kochi University, 4. ISAS, JAXA, 5. Graduate school of Environment Studies, Nagoya University

TIR is the thermal infrared imager onboard Hayabusa2, a Japanese asteroid exploration mission. It takes the 2D image of the brightness temperature distribution on the target asteroid Ryugu. Hayabusa2 will stay at so-called "home-position" which is on the line between Ryugu and Earth and 20 km above Ryugu, resulting almost constant solar phase angle in a short time scale. The observation of apparent temperature at a constant phase angle might mislead the thermos-physical parameter such as thermal inertia because it is known that the apparent temperature of a rough surface depends on the observation angle.

To evaluate the effect of the surface roughness on the apparent temperature, we conducted a numerical model on the rotational thermal evolution of a roughness, and TIR images are simulated by using the result of the numerical model. In the real operation of Hayabusa2 mission beginning in this summer, we will be able to evaluate the surface roughness by comparison of the real TIR image and the simulated TIR images for various roughness parameters.

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